

REMARKS

Claims 29-40 are pending in this application. By this Amendment, claims 29, 30 and 35-37 are amended to recite ceramic sintered substrate. See the specification at, for example, page 5, line 16, and page 30, lines 9-12. No new matter is added.

Reconsideration of the application is respectfully requested.

Applicant respectfully requests consideration of the references listed on Forms PTO 1449 submitted with the May 19, 2003 and August 8, 2003 Information Disclosure Statements.

The Office Action rejects under 35 U.S.C. §103(a) claims 29, 30, 32-35 and 37 over JP11-204238 in view of U.S. Patent No. 1,998,764 to Jordan et al. and further in view of U.S. Patent No. 5,331,134 to Kimura; and claims 31, 36 and 38-40 over JP11-204238 in view of Jordan, Kimura, and further in view of U.S. Patent No. 5,616,024 to Nobori et al. These rejections are respectfully traversed.

The Office Action admits that JP11-204238 does not disclose or suggest offsetting at least part of a heat generation pattern on a level different from that of others of the pattern, or a heater comprising a spiral wire. However, the Office Action asserts that Jordan, Kimura and Nobori, respectively, disclose these features. Applicant respectfully submits that JP11-204238, Jordan, Kimura and Nobori, either individually or in combination, do not disclose or suggest a disc-shaped ceramic sintered substrate and a heat generation pattern formed in an interior of a ceramic sintered substrate, a part of the heat generation pattern being displaced on an offset level different from others of the heat generation pattern in a thickness direction of the ceramic sintered substrate, as recited in claim 29.

As a preliminary matter, a sintered body is a texture made by sintering ceramic raw material powders together, and is not a single continuous crystal structure. As is known to one of ordinary skill in the art, with a sintered texture, a ceramic substrate is brittle.

Therefore, when a temperature of the heat generation pattern with a ceramic sintered substrate is increased, the heat generation pattern is expanded to compress the ceramic substrate and may produce cracks. If the pattern is confined on a same plane of the substrate, the cracks will be on the same plane and tend to connect with each other. As a result, the strength of the ceramic sintered substrate structure will be lowered.

When at least a part of the heat generation pattern is displaced on an offset level different from others of the heat generation pattern in a thickness direction of the ceramic sintered substrate, as recited in claim 29, cracks do not generate on the same plane. This may prevent the strength of the substrate from lowering, and thus may improve the anti-thermal shock property of the ceramic sintered substrate.

JP11-204238 discloses a ceramic heater including a ceramic substrate a conductive net-like material on the same plane. See Fig. 1. JP11-204238 does not disclose or suggest a ceramic sintered substrate. As discussed above, in a heater disclosed in JP11-204238, stress is concentrated and cracks are generated on the same plane, and the anti-thermal shock property is lowered. Thus, JP11-204238 does not disclose or suggest the subject matter recited in claim 29.

Jordan discloses a spiral heat element in a cooking plate manufactured from "cast iron". See Fig 2 and column 1, line 10. The cooking plate is not manufactured as a ceramic sintered substrate. No where does Jordan disclose or suggest ceramic sintered substrate. No where does Jordan recognize anti-thermal shock features. Thus, Jordan does not supply the subject matter lacking in JP11-204238.

Nobori discloses a ceramic heater including a spiral-coiled filament in an inorganic substrate 72 made of silicon nitride. See Fig 22a, and col. 24, lines 52-58. No where does Nobori disclose or suggest a ceramic sintered substrate. No where does Nobori disclose or

suggest an anti-thermal shock property of the ceramic sintered substrate. Thus, Nobori does not supply the subject matter lacking in JP11-204238.

Kimura relates to a heater by forming a heating element on the surface of a base plate, but does not provide the heating element in an interior of the base plate. See Fig 2. Kimura discloses a base plate made of pyrolytic boron nitride, but does not disclose or suggest a ceramic sintered substrate. See col. 3, lines 36-40. Kimura does not touch on the issue of a thermal shock which is at issue only when the heating element is existent in the interior. Therefore, Kimura does not supply the subject matter lacking in JP11-204238.

For at least the above reasons, JP11-204238, Jordan, Kimura and Nobori, either individually or in combination, do not disclose or suggest the subject matter recited in claim 29, and claims 30-40 depending therefrom. Withdrawal of the rejection of claims 29-40 under 35 U.S.C. §103(a) is respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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JAO:GXL/sqb

Attachment:
Petition for Extension of Time

Date: December 2, 2003

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